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boss and in the amazing concentration of financial and industrial control in the hands of a few men. But that no need of our university world is keener than the need of an increase in the personal importance, dignity and self-assertion of the professor, we are profoundly convinced. And it is encouraging to note that on every hand when the issue arises sentiment is strongly manifested on the right side. The dismissal of Professor Ross from Leland Stanford found nowhere stronger condemnation than among men thoroughly out of sympathy with his economic views, but deeply conscious of the importance of professorial independence. The report recently made to the Carnegie Foundation by a mechanical engineer was at once recognized everywhere as a *reductio ad absurdum* of the idea that colleges and universities should be conducted on machine-shop principles. The attempt to get the maximum of efficiency at every point by the exercise of supervision and control, even when not carried to that ridiculous extreme, is destructive of that vitality upon which the true efficiency of a university depends, and which resides in the inherent personal qualities of its professors. It is the permanence of tenure of professors, the undisputed dignity and honor of their position, that have made the great universities of the old world what they are. And no substitute for the vitalizing influence of these essential elements can be provided by any amount of supervisory meddling or administrative perfection.—New York *Evening Post.*

SCIENTIFIC BOOKS

Conduction of Electricity through Gases and Radioactivity. By R. K. McCLUNG. Philadelphia, P. Blakiston's Son & Co. Pp. xiv + 245.

Among the many books which have appeared upon this subject within the past five years this is the first which attempts to present a definite course of instruction "suitable for the less advanced student or undergraduate." The feature which differentiates it most markedly from other books and which gives it its great importance is the presentation of detailed directions for 125 laboratory experiments. The book is in fact built up about these experiments and any student who performs them all can scarcely fail to gain a fundamental grasp of the principles of gaseous conduction and radioactivity.

It may perhaps be questioned whether many undergraduates will be found who will have either time or ability to perform satisfactorily all of the experiments outlined—in fact, I confess to a suspicion that perhaps no one person has ever performed all of them, for I should estimate that that would be a task requiring four or five years of continuous work by a well-trained experimenter. Nevertheless, the book is a great boon for the student who is just beginning research in this field as well as for the instructor who is directing it, for it collects in compact, accessible form a multitude of practical points which are essential to successful experimenting, but which each individual experimenter has heretofore had to "dig out" for himself or else to obtain from some more experienced person by the laborious process of individual oral instruction.

The one danger which will have to be guarded against is that the student by virtue of being crowded too rapidly over the experimental ground covered by practically all of the important researches in this field of the past fifteen years does not develop the habit of very superficial experimenting. The book meets an important need and will doubtless receive wide use.

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December 28, 1910

Die Ernährung der Wassertiere und der Stoffhaushalt der Gewässer. Von AUGUST PÜTTER. Jena, Gustav Fischer. 1909. Pp. 168. Price M. 5.0.

Dr. Pütter's researches on the food of aquatic animals have called attention to a source of supply which had been almost or quite disregarded. Some of the views expressed in his earlier papers met with more or less criticism because the results obtained by other investigators were not always in accord

with his theories and the present volume is a welcome contribution because Dr. Pütter gives a more detailed presentation of his views and replies to the more important objections offered by his critics.

The first chapters are preparatory to the discussion of the chief topic, *i. e.*, how aquatic animals obtain an adequate supply of food. They deal with such questions as the intensity of metabolism in the various groups of aquatic animals, the food requirements of these animals, the different types of food of various groups, including both vertebrate and invertebrate forms, and the source of organic substances dissolved in the water. The view is presented that the estimation of the food requirement of an animal should be based upon the area of active absorbing and secreting surfaces, more especially the effective respiratory surface, rather than upon the mass, because the oxygen consumed is a good measure of metabolism, and the rate of consumption of this gas shows the intensity of this process. Calculated on this basis, the author finds that the food requirement of many aquatic animals has been greatly underestimated hitherto and that the total demand in a body of water is frequently greater than the supply of organized food which is produced by it. One instance is cited in which the demand for food by the zooplanktonts of a body of water exceeded the supply of organized food for nine months out of a period of thirteen, and in another instance demand exceeded supply for each of thirteen months. Naturally, this excess of demand over supply raises the question as to how this deficit is made good and the author's answer to this query is his important contribution to the subject under discussion.

Dr. Pütter maintains that aquatic animals have recourse to the organic substances which are always found in solution in natural waters, and in this way the deficiency is supplied. He asserts, in fact, that these dissolved organic substances which are generally present in amounts varying from ten milligrams to twenty milligrams per liter of water are not only drawn upon in emergencies, but that they are the chief source of the food of some forms.

With respect to the ability of aquatic animals to make use of dissolved food an experiment by Knorrich is cited in which *Daphnes* survived for a period of fourteen days on a diet consisting solely of dissolved food. The author himself found that goldfish lived for a period of forty-one days in tap water which contained no organized food and the oxygen consumed substantially accounted for the loss in weight; but when organic substances were dissolved in the tap water, the goldfish survived for seventy-eight days, nearly twice as long, and the oxygen consumed greatly exceeded the amount that would account for the loss in weight. The conclusion drawn from this experiment is that these goldfish were able to make use of the dissolved food, because they lived so much longer when supplied with this kind of food than when given neither dissolved nor solid food, and because of the extra quantity of oxygen consumed.

Solid food is not regarded as a thing which may be dispensed with entirely, but dissolved food may play a more or less important rôle, even to the point of being the chief source of food for some organisms, such as sponges, which frequently appear to receive very little in the way of organized food.

Dr. Pütter's conclusions are not always convincing and there is a paucity of evidence in some instances which serves to show how recently this field has been invaded by investigators; but the views expressed are suggestive and will doubtless stimulate investigations in this field of research and eventually result in giving us a much better knowledge of the nutrition of aquatic animals.

C. JUDAY

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE
SECTION E

THE regular annual meeting of Section E of the American Association for the Advancement of Science was held in Pillsbury Hall, University of Minnesota, December 27, 28 and 29. A program of papers was read both morning and afternoon each day. Due to the unavoidable absence